3.5/30

$$y = \frac{\sin x}{\sec(3x+1)}$$

$$\frac{dy}{dx} = \frac{(\cos x)(\sec(3x+1)) - (\sin x)(\sec(3x+1)\tan(3x+1)\cdot 3)}{(\sec(3x+1))^2}$$

$$y = (\sin x)(\sec(3x+1))^{-1}$$

$$\frac{dy}{dx} = (\cos x)((\sec(3x+1))^{-1}) + (\sin x)(-(\sec(3x+1))^{-2} \ldots$$

$$\ldots (\sec(3x+1)\tan(3x+1)\cdot 3)$$

$$y = (\sin x)(\cos(3x+1))$$

$$\frac{dy}{dx} = (\cos x)(\cos(3x+1)) + (\sin x)(-\sin(3x+1)\cdot 3)$$

3.6/9) $x^3+xy-2x=1$

think of y as a f^n of x

Then use the chainrule

$y=\frac{1+2x-x^3}{x}$

$$\frac{d}{dx}\left(x^3+xy-2x=1\right)$$

$$\Rightarrow \frac{d}{dx}(x^3)+\frac{d}{dx}(xy)-\frac{d}{dx}(2x)=\frac{d}{dx}(1)$$

$$3x^2+\left((1)(y)+(x)\left(\frac{dy}{dx}\right)\right)-2=0$$

$$\frac{x\frac{dy}{dx}}{x}=\frac{2-3x^2-y}{x}$$

$$\frac{dy}{dx}=\frac{2-3x^2-y}{x}$$

3.6/10

$$\sqrt{y} - \sin x = 2$$

$[f(g(x))]' = f'(g(x)) \cdot g'(x)$

$y = (2 + \sin x)^2$

$x^2 \rightarrow (\quad) \rightarrow (\quad)$

$2(2+\sin x)(\cos x)$

$2x \frac{d}{dx}$ $2 + \frac{d}{dx}$

3.6/10

$$\frac{d}{dx}\left(\underset{y^{1/2}}{\overset{(y)^{\frac{1}{2}}}{\sqrt{y}}} - \sin x = 2\right)$$

$$\frac{1}{2} y^{-\frac{1}{2}} \underbrace{\frac{dy}{dx}}_{\text{chain rule}} - \cos x = 0$$

$$\frac{dy}{dx} = 2(\cos x) y^{1/2}$$

$$= 2(\cos x)\sqrt{y}$$

[illegible]

$$\left[f(g(x))\right]'$$

3.5/28

$$y = \left(\underbrace{\sqrt{x}}_{x^{1/2}}\right)\left(\underbrace{\tan^3(\sqrt{x})}_{(\tan(x^{1/2}))^3}\right)$$

$$\frac{dy}{dx} = \left(\frac{1}{2}x^{-\frac{1}{2}}\right)\left(\tan^3\sqrt{x}\right) + \left(\sqrt{x}\right)\left(3\left(\tan(x^{1/2})\right)^2 \sec^2(x^{1/2})\left(\frac{1}{2}x^{-1/2}\right)\right)$$

I GNOW

* Power Rule
* Product Rule
* Quotient Rule
* Chain Rule

ALWAYS chg $\sqrt{\ }$ to $^{\square}$

3.6/91

$1 + y - 2 = 1 \Rightarrow y = 2$

$$x^3 + xy - 2x = 1$$

x	y
1	2

think of y as a f^n of x
+ use chain rule

$(f(x))$

$(f'(x))$

$$\frac{d}{dx}\left(x^3 + xy - 2x = 1\right)$$

$$\frac{d}{dx}(x^3) + \frac{d}{dx}(xy) - \frac{d}{dx}(2x) = \frac{d}{dx}(1)$$

$$3x^2 + \left[(1)(y) + (x)\left(\frac{dy}{dx}\right)\right] - 2 = 0$$

$$x\frac{dy}{dx} = 0 + 2 - 3x^2 - y$$

$$\frac{x\frac{dy}{dx}}{x} = \frac{0 + 2 - 3x^2 - y}{x}$$

$$\frac{dy}{dx} = \frac{2 - 3x^2 - y}{x}$$

$$\left.\frac{dy}{dx}\right|_{\substack{x=1\\y=2}} = \frac{2 - 3(1)^2 - (2)}{(1)} = -3$$

find eqn of tangent line:

slope: -3

pt: $(1,2)$

$$\underset{y_0}{y - (2)} = \underset{m}{(-3)}\left(x - \underset{x_0}{(1)}\right)$$

$$y = \boxed{-3x + 5}$$

3.6/10)

$$\sqrt{y} - \sin x = 2$$

$$\frac{d}{dx}\left(y^{1/2} - \sin x = 2\right)$$

$$\left(\frac{dy}{dx}\right)\left(\frac{1}{2}y^{-1/2}\right) - \cos x = 0 \qquad \frac{d}{dx}\left((2x+1)^{1/2}\right)$$

$$\times \cancel{1}2$$

$$\frac{dy}{dx}\left(\frac{1}{2}y^{-1/2}\right) = 2\cos x \qquad \frac{1}{2}(2x+1)^{-\frac{1}{2}}(2)$$

$$\frac{dy}{dy} = \frac{2\cos x}{1/\sqrt{y}}$$

$\frac{d}{dx}(2 \cdot x)$

$(0)(x)+(2)(1)$

$=2$

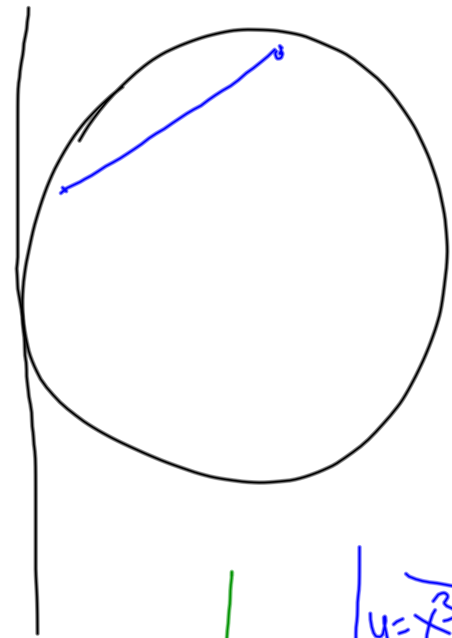
$\frac{d}{dx}(2x)=2\frac{d}{dx}(x)$

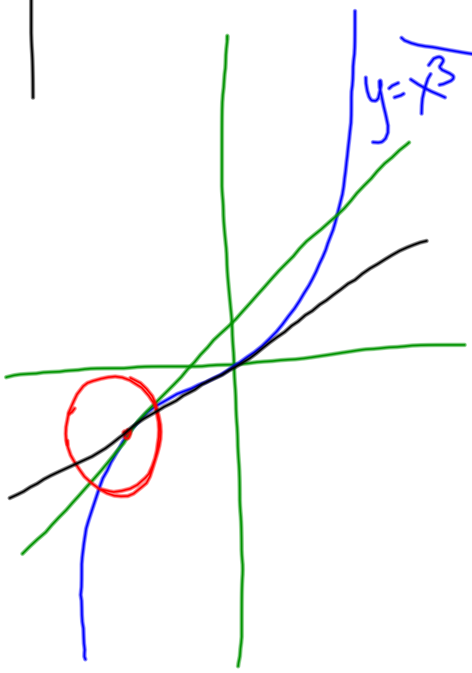
$=2(1)=2$

B/C

derivative is a limit

$\lim_{x \to a, +\infty, -\infty} c f(x) = c \lim_{x \to a, +\infty, -\infty} f(x)$




$y=x^3$

3) $f(x) = \begin{cases} \dfrac{\sin x}{|x|}, & x \neq 0 \\ 1, & x = 0 \end{cases}$

Continuous at $x = 0$?

fn $f(x)$ is cont @ $x=0$ if

1) $f(0)$ exists

2) $\lim\limits_{x \to 0} f(x)$ exists

3) $\lim\limits_{x \to 0} f(x) = f(0)$

$$\lim_{x \to 0} \frac{\sin x}{|x|}$$

$$\lim_{x \to 0^+} \frac{\sin x}{x} = 1$$

$$\lim_{x \to 0^-} \frac{\sin x}{-x} = -1$$

$\therefore$ lim DNE

D